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AUTHOR Metz, Ron
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ABSTRACT

This instructional unit is one of 10 developed by students on various energy-related areas that deals specifically with fireplaces and fuels. Its objective is for the student to be able to discuss the structural design, operation, and efficiency of fireplaces and characteristics of different fireplace fuels. Some topics covered are fuels, elements of the fire triangle, factors relating to high efficiency of masonry fireplaces, uses of grates and chimney, heat recovery, and prefabricated and free standing fireplaces. Materials in each unit may include some or all of the following: terminal and specific objectives, list of references, information sheet with terms and definitions, informative materials, transparency masters, assignment sheet(s), and unit test with answers. (YLB)

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FIREPLACES AND FIREPLACE FUELS

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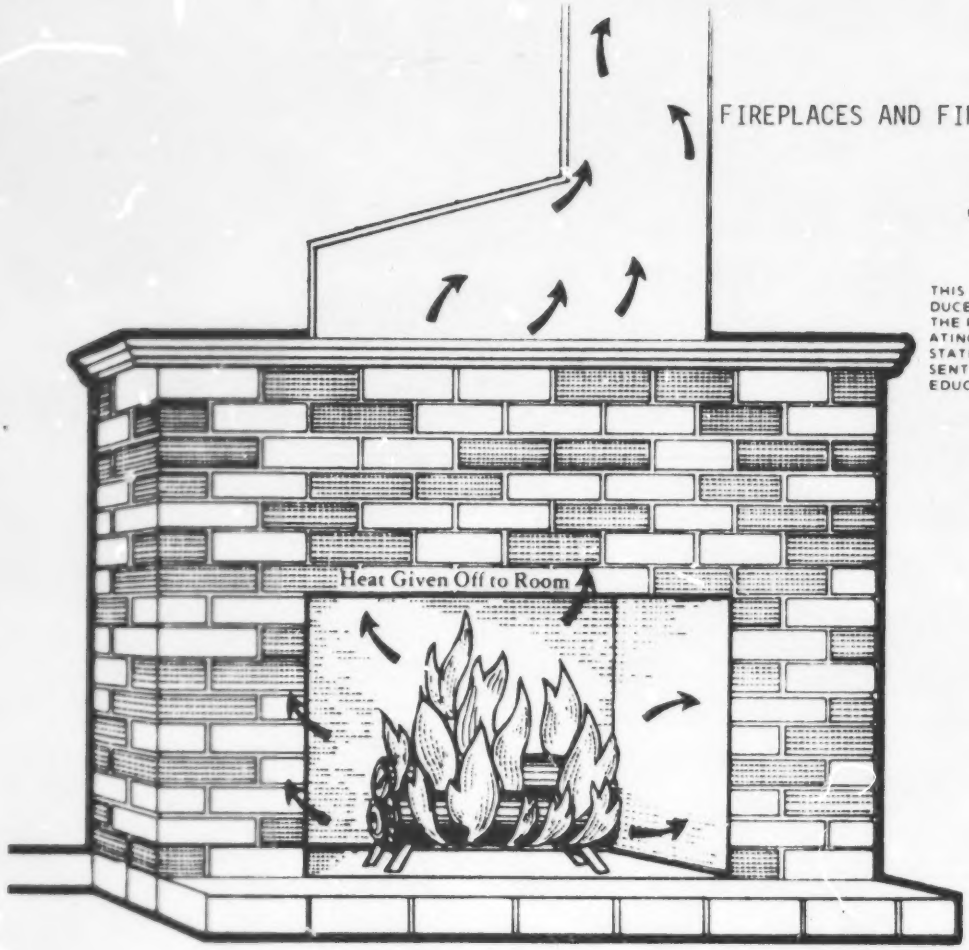

by

Ron Metz

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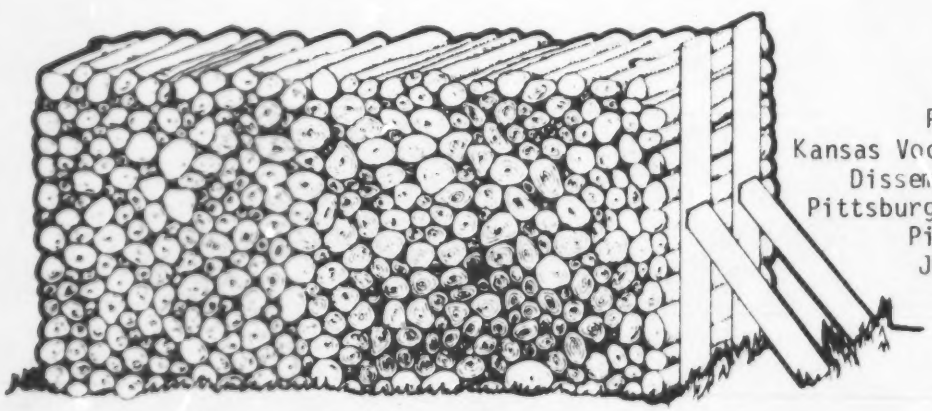

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FIREPLACES AND FIREPLACE FUELS

TERMINAL OBJECTIVE

Upon completion of this unit the student will be able to discuss the structural design, operation, and efficiency of fireplaces. He will also be able to discuss characteristics of different fireplace fuels. Proficiency will be evidenced by a recommended 85% accuracy on the unit test.

SPECIFIC OBJECTIVES

Upon completion of this unit the student will be able to:

1. Identify factual information from non-factual information concerning fireplaces and fuels for fireplaces.
2. Identify the three elements of the fire triangle.
3. Explain the relationship of fuel to temperature by discussing why matches are unable to ignite thick logs.
4. Discuss three points that relate to high degree of efficiency of masonry fireplaces.
5. Identify, in written form, four purchasing points to keep in mind while buying firewood.
6. List four alternative resources to consider to obtain firewood.
7. Discuss three energy saving features of glass fireplace enclosures.

FIREPLACES AND FIREPLACE FUELS

INFORMATION SHEET

I. Terms and Definitions

A. Ash pit - Area or pit located beneath the grate in a fireplace to collect ashes

B. Cord - Measurement of wood - pile is four feet long stacked four feet high and eight feet long, volume of 128 cubic feet

C. Face cord - Stacked same as regular cord but length of logs may vary. Example: "two-foot", "three foot" face cords

D. Flue - Enclosed passageway for flame and smoke to escape to outside air

E. Hearth - Brick, stone or cement area of floor in front of a fireplace

F. Hygroscopic - Ability of a substance to absorb high degree of water

G. Kindling - Small bits of wood or twigs used as base for starting fires

H. Kindling Temperature - The temperature at which a material will burst into flame

I. Lintel - A metal structure supporting the masonry opening in the front of a fireplace

J. Mantle - Broad shelf like area of fireplace located above lintle, frequently decorative in nature

K. Smoke shelf - shelf or baffle in a smoke flue designed to prevent downdraft

FIREPLACES AND FIREPLACE FUELS

This unit shall discuss fireplaces and fireplace fuels. In order to use a fireplace correctly, one needs to know the basics of the fireplace. The basics involve the design, operation and efficiency of fireplaces. One also needs to know about the different fireplace fuels. To understand how a fireplace works, one must also know what makes a fire.

How Fire Works

Fire is the common name for the chemical process called combustion. Three elements must be present for combustion to occur. These three elements are referred to as the "Fire Triangle". The first element needed is heat or temperature. The second element is fuel which will ignite at that temperature. The third element is sufficient oxgyen. If there is not sufficient oxygen the fire will smother shortly after igniting. If any of these three elements is missing, fire cannot occur. By the same token, take one away and the fire will die. Understanding how these three elements react with each other will help the user to make cleaner fire. Understanding will also call for a more efficient working fire. This in turn makes it more economical.

Temperature

Fire occurs when enough fuel and oxygen are raised to a temperature that permits combustion. This varies with the type of fuel and its kindling temperature. The flame of a lighted match has a concentrated temperature of about 1800° F. This is high enough to ignite twigs or newspaper. (Twigs and newspaper are used as a base for fires.) The match will not ignite a thick log. (See TM.) There is one basic

reason for this. Wood absorbs heat. The thicker and denser the wood, it will have to absorb more heat before it can be ignited. Fires are started with small twigs or kindling. Twigs take a second or two to absorb heat from the match before igniting. The twigs heat and ignite larger pieces of wood. The larger pieces of wood heat and ignite the larger logs. This should be a repetitive process to insure a good fire. Raising the temperature of wood transforms the solid matter into gaseous matter. So scientifically; burning wood is actually burning gases produced by heating wood to a high enough temperature. To continue this process, the high temperature must be maintained. It can only be maintained in the presence of adequate fuel. There also needs to be a supply of oxygen. The higher the temperature, the faster the rate of combustion occurs.

The fireplace itself can aid in creating a high temperature for combustion. The most efficient fireplaces compare with the type of masonry used such as fire brick. The masonry re-radiates infrared heat back into the fire. This makes the fire burn hotter. It also makes better use of the fuel. A fireplace with three surrounding sides of masonry is preferred. It is preferred to the open-sided fireplace. The three sides of masonry will reflect more heat into the fire. The same is true of a campfire with rocks on three sides.

Remember, the temperature must be high enough to permit combustion. High temperatures must be maintained to keep it burning warmer. This in turn helps it burn more efficiently.

Fireplace Fuels

The type of fuel will greatly affect the type of fire. The fuel

will affect the efficiency of the fire. Also, it will affect how economical the fire is.

Dry woods, pound for pound, contain about the same amount of heating power. Kiln-dried woods provide the greatest heating value. However, most people do not have access to kiln-dried woods. Woods vary in the amount of water they will absorb. (See TM.)

Wood is usually purchased by volume. The terms involved are cord and face cord. A cord is a pile of wood, 4 feet long, stacked 4 feet high and 8 feet long. This volume is 128 cubic feet. A face cord is stacked the same way as the standard cord. It differs only in the length of the pieces of wood. For example, a "two-foot" face cord is a pile of wood stacked 4 feet high and 8 feet long. But its pieces are two feet long instead of four. The pieces of wood and total volume are half the size of a standard cord. A face cord's logs may be any length and the volume will depend on the length of its logs. The cord or face cord contains some air space. So the actual amount of solid wood will vary greatly.

There are many points to consider when buying wood. How the wood is cut and shaped will affect how much actual solid wood can be stacked in a cord. Bumpy or crooked logs create large air spaces. Logs piled one directly on top of another contain less solid wood than when the logs are piled in spaces created by those around them. In other words, a pyramid-type of stacking is preferred to vertical stacking. Also, very large logs create big air spaces. The spaces should be filled in with small logs. These points also affect the cord's BTU content.

When acquiring wood for the fireplace, consider the condition of the wood. "Green" or freshly cut wood contains up to 30% water. Water does not add heating power. It does interfere with efficient burning. High temperatures are needed to first dry out the wood before combustion can take place. High temperatures are hard to attain with green wood. The reason is that the water in the wood cools the combustion process. The heating value of green wood is about half that of kiln-dried wood. Green and wet wood produces creosote and soot which makes it messy to use. This wood also creates sparks which are fire hazardous. Wood that is tight, solid on the ends with visible saw marks indicate that the wood may be green. Wood that is dried and seasoned properly can be identified by cracks in the end pieces.

Wood should be stored away from precipitation as wood is highly hygroscopic. That is, it absorbs water like a sponge. Store away from the weather. This includes rain, snow, high humidity. Also, keep off the ground as wood will absorb moisture from the ground. Avoid storing next to the house. There is a possibility that the wood could be termite contaminated. If it was stored next to the house, there would be the possibility of the contamination being transferred to the house. Dried wood stored out doors at least 6 months may contain 12-15 percent water. Wood stored indoors will drop the moisture content to as low as 8 percent. There are other advantages of indoor storage. It reduces the chance of dry rot. It limits the growth of insects outdoors which may move into the home when the wood is brought in.

There are several ways to get firewood. One economical way is to

cut down the dead trees on your property. Landfills and dumps are another source. Gather discarded trees and timber damaged by storms. Lumber companies sell scrapwood such as slabs, trim and edging at low prices. Power companies may sell logs, timber, and tree tops cut to make way for power lines. Free firewood is available in some national forests. A permit is necessary to gather wood there. For more information contact the U.S. Forest Service. These are just a few places to get wood.

The secret to a cheery, long-lasting fire is combining firewoods. Softwoods such as pine, spruce and fir are easy to ignite. They burn rapidly with a hot flame. They are messy and may cause a dangerous build-up of flammable soot. The heavier hardwoods such as ash, birch, beech and oak burn less vigorously with a shorter flame. Oak especially produces steady glowing coals. By comparison, oak lasts a long time. The aroma produced by some firewoods enhances aesthetics. Fruit and nut tree wood gives off an aroma similar to the open campfire. The fragrance of fruit comes from cherry, apple, beech and hickory. These aromatic woods are more expensive than woods with greater heat value.

Oxygen

Oxygen is provided from two sources. Oxygen comes from the wood itself. When dry, about 40 percent of its weight is oxygen. It also comes from the air in the surrounding environment. Twenty percent of the air is oxygen. There is also nitrogen in the air. Nitrogen cools the combustion process.

For the greatest burning efficiency in a fireplace the flow of air must be controlled. Control comes from the damper. The damper is located above the firebox in the chimney throat. The damper can be opened or closed to regulate the amount of air and smoke which escapes

up the chimney. The damper slows the air flow. This improves the efficiency of combustion. One problem occurs in setting the damper so that no smoke enters the room. This is difficult because conditions in the fire are not constant. The best economical method of control is to use a glass fireplace enclosure. This enclosure attaches to the front of the fireplace. It is virtually airtight. That is, the outside air supply is used instead of the heated air from inside the house. There is a special damper at the bottom of the glass enclosure. This damper allows for better regulation of the air flow. With the damper located on the enclosure itself enables the fire to be left by closing the damper and glass doors. The fire is then safely contained allowing the smoke to escape up the chimney.

Stages of Combustion

Four stages occur in the combustion in wood fires. First, the moisture from the wood is evaporated. Secondly, with high temperatures, the solid wood is changed into gases. These gases are then burned. Lastly, the residual material, such as charcoal is burned. These steps are overlapping. For the fireplace to burn efficiently the "Fire Triangle" must be controlled. Efficiency results in a cleaner fire, making it more economical and more enjoyable.

Fireplaces

Fireplaces were once a major source of home heat. Today the fireplace is a source of supplementary heat. But most fireplaces are used only for decoration.

The fireplace is uaully constructed into a wall. The fireplace is lined with firebrick on 3 sides and the floor. It is open at the front. The chimney is built above the fireplace. The fireplace throat

is usually equipped with a damper. The damper closes off the chimney when the fireplace is not in use. The damper prevents heat loss in the winter and prevents entry of small animals in the summer. The smoke shelf built above the fireplace prevents downdrafts from blowing smoke into the room. The front opening is 10-12 times the flue area. The width of the opening is always greater than the height. The fireplace has a depth of two feet or more. (See TM.)

The firebox is the part of the fireplace that contains the fire. So it must be large enough to hold the amount of wood to be burned. It should be made of non-combustible material. It should be able to admit air and expel smoke. There are many styles, shapes and dimensions available. They range from built-in masonry to free-standing models.

Masonry Firebox

The masonry firebox is the only one that can provide maximum warmth and efficiency. It may still be warm up to 12 hours after the fire has gone out. It is giving off infrared radiation. The heat from the fire has "sunk" into the masonry and now it is slowly being released. This heat producing factor is unavailable with other types of fireplaces. The warmth of the fire comes from around the sides of open fire (infrared radiation). It also comes from above the fire which is the heat from rising hot gases. Not more than 20 percent of the heat output is produced as infrared radiation. As much as 80-90 per cent of the heat output is produced in the form of hot gases. For example: A pot of water hanging above a fire will heat faster than one placed on any side of it. Masonry absorbs some heat. It then re-radiates most of that heat back into the fire and then into the room through the firebox opening. This is why with masonry the fire is

hotter, more efficient and more economical. (See TM.)

Use of Grates and Chimney

A fire built on the grate has an effect of letting excess air circulate under the fire. As this air is mostly nitrogen, it cools the fire. This results frequently in accumulation of ashes. These ashes close off the space under the grate. The fire also melts the steel or cast iron grate. Greater efficiency is gained by building the fire directly on the floor of the firebox.

The chimney is designed to conduct smoke from the firebox to an outside atmosphere. The basic principle is shown by a simple U tube. (See TM.) The left half is filled with cold air and the right half is filled with warm air. The higher density cold air will sink, pushing the warm air up. Now look at the chimney. The chimney becomes warm air half of the U tube. The living space of the home becomes the cold air half. When the damper is closed, heat loss takes place. (See TM.) With the damper open, cool air is constantly supplied with air. This air comes from leakage around doors and windows. This provides the upward flow into the chimney. This draft travels from the room into the firebox, up the chimney shaft and out. As the fire in the firebox raises the temperature of the air in the chimney, the speed of the draft will be increased. This draft is necessary to allow gases and exhaust products to escape. If the draft is not strong enough, it will cause the fireplace to smoke. The gases from the fire cannot get into the chimney. It then enters the living area. A glass enclosure reduces the amount of air trying to get up the chimney. Thus, it makes the inside of the chimney hotter. It increases the capacity to remove smoke from the fire. Proper draft

allows for most of the fire's heat to escape with it. Only the heat from some of the infrared radiation enters the room.

Heat Recovery

To get the best efficiency from a fireplace, build it on an interior wall. All heat will then be radiated within the house. When built on an end wall or exterior wall, there is some heat loss. This loss is due to the radiating effect being diminished. Man has tried to develop a method or device to recover this heat loss. The commercial devices that nave been developed lack efficiency. They are generally designed to take the heat out of the fire. This reduces the temperature of combustion. Thus, making it less efficient. Many times the devices do not restrict the amount of air flowing through the firebox. Free flowing air also reduces efficiency of combustion. Let us examine some of the systems.

Using tube grates is one system developed to recover heat loss. (See TM.) They draw cold air into the tube openings at the bottom. The grate heats the air as it passes through the tubes. It discharges hot air into the room from the tube openings at the top. This process cools the combustion process. Cold air is constantly being circulated into the fire bed. It does not block the airflow. That is, much of the heat escapes. Many of these units are expensive to buy. Some people build their own grates from steel pipe or tubing. They purchase small blower motors from electric motor distributors.

Circulating fireplaces take the cold air in the room into the fireplace. It then circulates warm air into the room through vents. These verts are located either above the firebox or at the sides. This

process also cools the combustion point making a cooler burning fire. These fireplaces are composed of metal. They do not re-radiate heat back into the fire as the masonry does.

Some systems are still in the experimental stage. The exchanger system is one. This system uses water. The water is converted into steam which goes into a radiator system. These radiators circulate the steam through the system. As it is cooled back to liquid it is recycled back to a boiler. It then repeats its cycle. The system shuts off after the fire dies down.

In summary, the masonry firebox is the most efficient. It should have an attachment that blocks excess air from cooling the combustion process. There should be a way to block the chimney from letting the home's heated air escape.

Operating A Fireplace

Be certain the chimney damper is open. Do not assume it is open based on the position of the damper handle. Rather than making a mistake, and having smoke throughout the house, stick your head into the fireplace and look up.

Remove all ashes from the previous fire. Because it is not recommended using a grate, this is very easy to do. Be safety conscious. Make sure there are no hot coals left in the ashes. Always use a metal container to carry out ashes. Wood ashes contain many minerals which may be useful for the lawn and garden. (Scatter thoroughly as too much of anything is not good.)

Place five or six pieces of wood in the firebox. Place a crumpled newspaper and some kindling under the wood. Light the paper with a match and close the glass doors and open its bottom draft. If a

glass door is not used, a burning, crumpled newspaper on top of the wood will help to increase the draft and reduce the fire's initial smoking. (For maximum heat effectiveness and minimum heat loss, always keep the glass doors closed.)

Occasionally poke the wood (use a tool from the fireset) which will keep it burning brightly. Add more wood whenever necessary.

Completely close the bottom damper of the glass enclosure doors when ready to let the fire die down. If not using glass doors, wait several hours, then make certain there are no glowing embers before closing the chimney damper.

If using a properly fitted glass enclosure and one wants to keep the fire going a long period of time, he may. Use three or four heavy pieces of wood 8" - 9" in diameter. Spread these on a bed of hot coals. These will burn very slowly. They should still be a glowing red 8-10 hours later. Some experimentation with the fireplace and wood may be necessary to achieve this period of time.

Periodically, examine the chimney for excess accumulations of soot. Raking the flue surface with the fingers should get them "sooty". If this produces falling chunks or crumbles the soot, the chimney should be cleaned.

For safety's sake always use a fire screen or glass enclosure doors. Remember that laying the wood in the "shed roof" fashion prevents the logs from rolling out of the firebox.

There are a few more tips on having safe fires. Make sure the room is well ventilated: the damper open and the flue unobstructed. Close the damper when the fire is completely out. Place a screen in front of the grate to stop sparks. As a precaution, keep a fire ex-

tinguisher handy. Never use flammable liquids indoors to light a fire.

Do not build too big a fire. Three or four logs usually will provide all the heat and flames you want. Rake the coals toward the front of the grate before adding new logs. Place new logs at the rear of the fireplace.

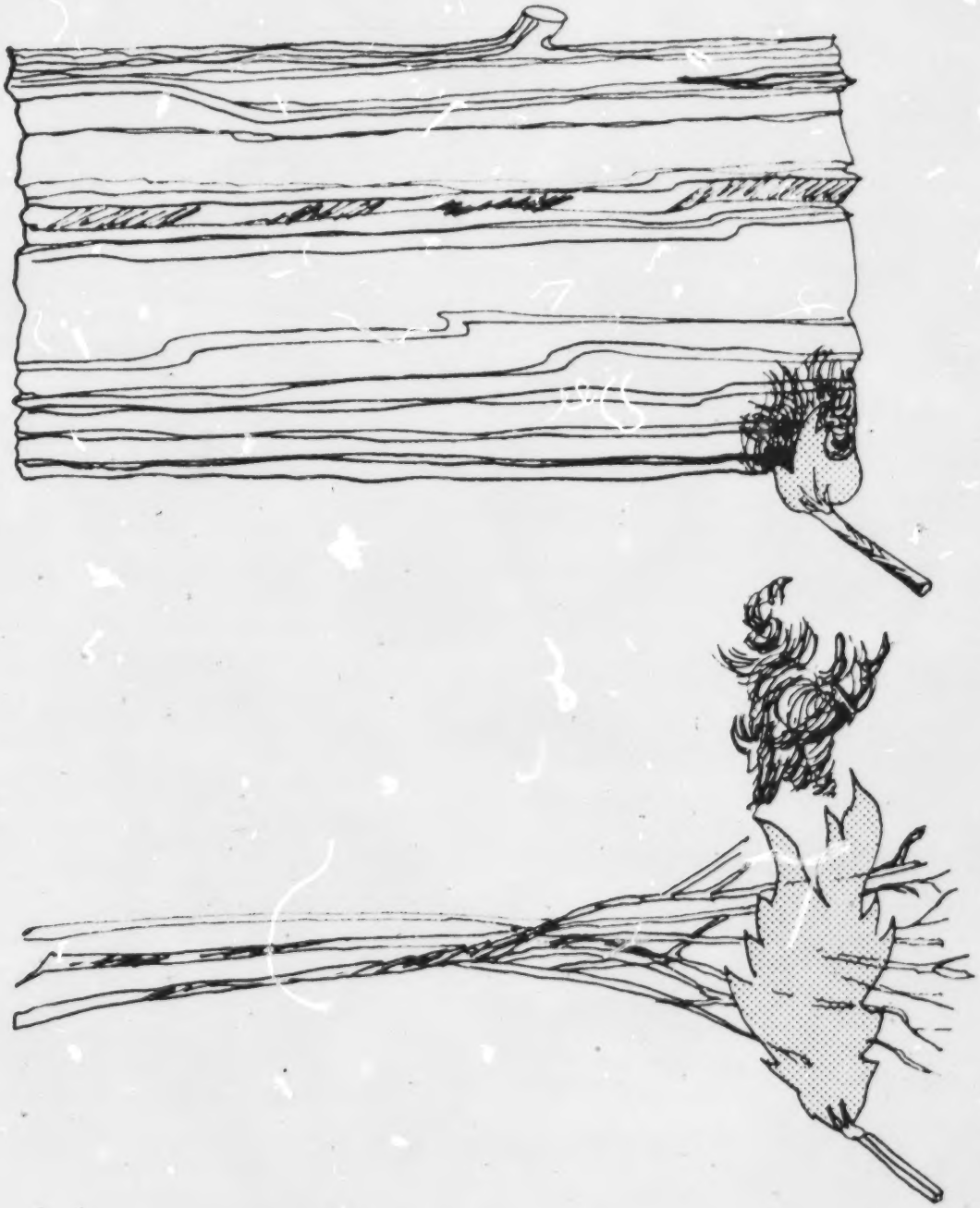
Insurance companies do not consider fireplaces a fire hazard. However, consumers should contact their agent before installing one. Each home is considered as an individual case. Some companies decline to insure homes using wood burning stoves or freestanding fireplaces as the sole source of heat.

Prefabricated and Free Standing Fireplaces

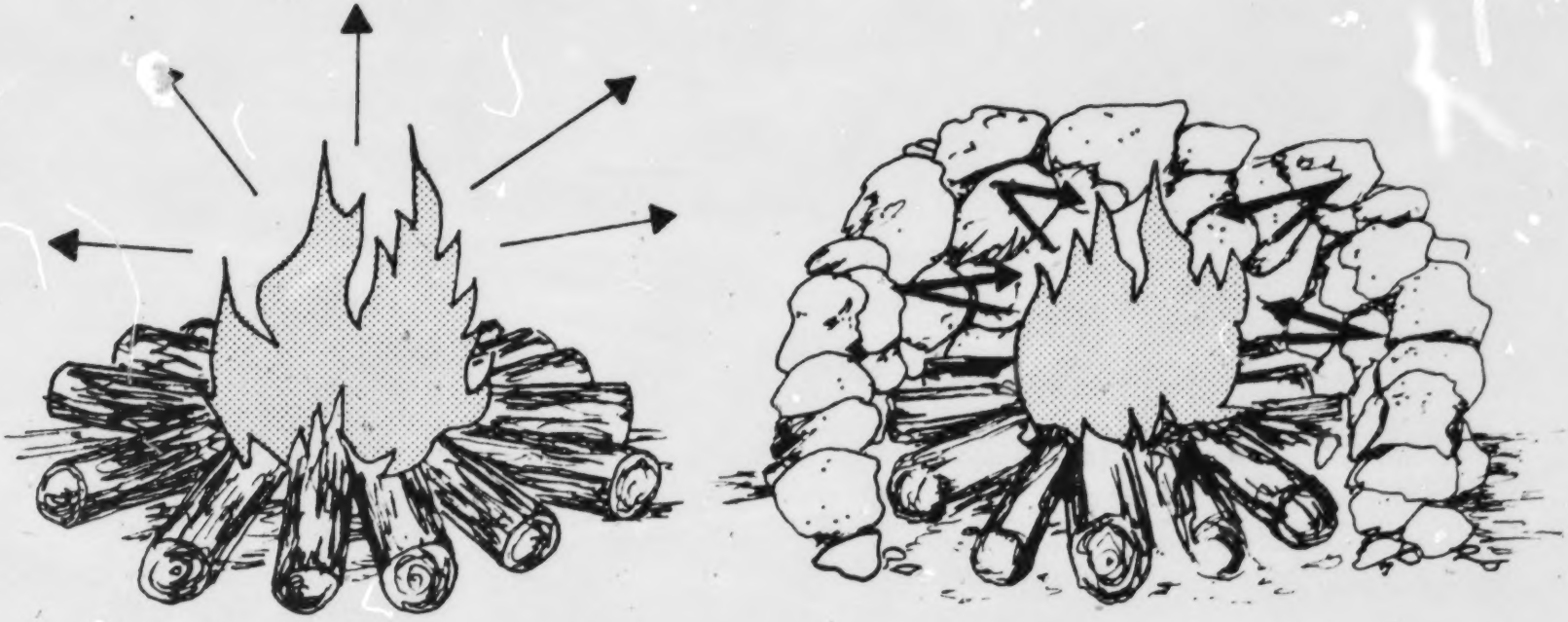
Metal fireplaces will not burn wood as efficiently as masonry fireplaces. They also will not produce the amount of heat the masonry fireplaces produce. The metal conducts heat away from the fire. Metal will not re-radiate heat back into the fire so that the fire will burn hot and efficiently. Masonry will hold heat several hours after the fire dies down. Metal will not. Metal fireplaces absorb heat quickly and lose heat quickly. The firebox is constantly cooled by air circulating around it. The metal fireplace is more costly to operate.

Let's take a look at how a preformed metal firebox is designed. (See TM.) The sides and upper parts have double walls. Air is drawn in at the bottom. It is discharged through vents at the top. Air is projected into the room in a way similar to the warm air gravity system.

THE RELATIONSHIP OF MATCH TO SIZE OF WOOD



HOW POSITION OF ROCKS AFFECT HEAT OF CAMPFIRE



PROPERTIES OF WOOD

SPECIES	HEATING VALUE KILN DRIED BTU/LB.	HEATING VALUE AIR DRIED BTU/LB.	HEATING VALUE GREEN BTU/LB.	WEIGHT/ CORD LB. GREEN	WEIGHT/ CORD LB. AIR DRIED	BTU/CORD AIR DRIED
OAK, WHITE	8316	5558	3972	5600	4300	23,899,400
ASH, WHITE	8480	5395	4628	4300	3800	20,501,000
ELM, WHITE	8510	5710	3591	4400	3100	17,701,000
BEECH	8591	5359	3940	5000	3900	20,900,100
BIRCH, YELLOW	8586	5225	3804	5100	4000	20,900,000
PINE	9153	5864	4226	3300	2200	12,900,800
AVERAGE	8606	5518	4026	4616	3550	19,467,050

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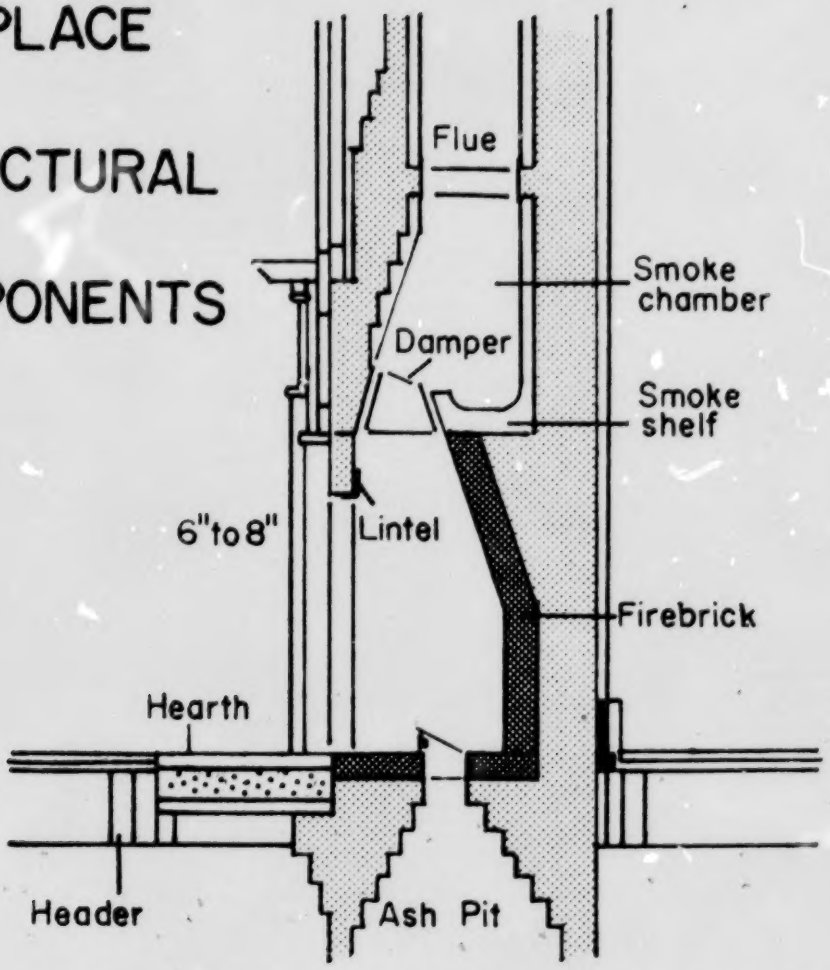
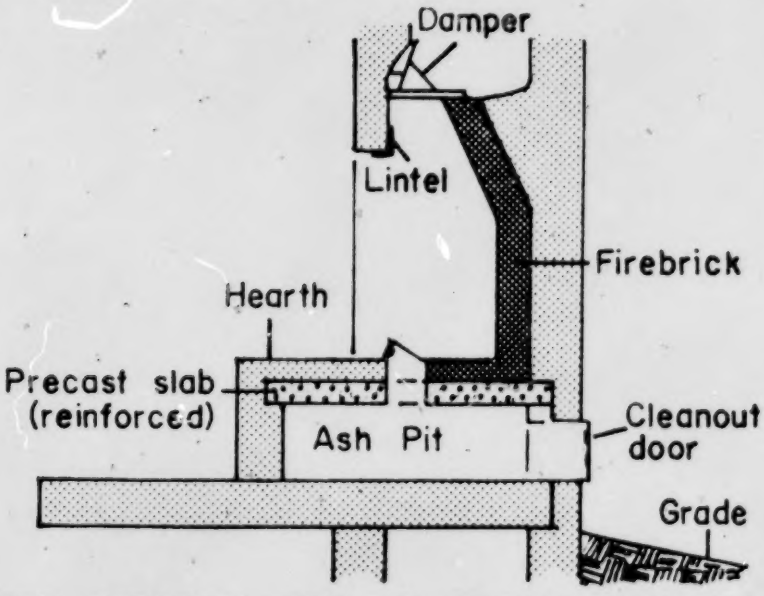
TM III

FIREPLACE STRUCTURAL COMPONENTS

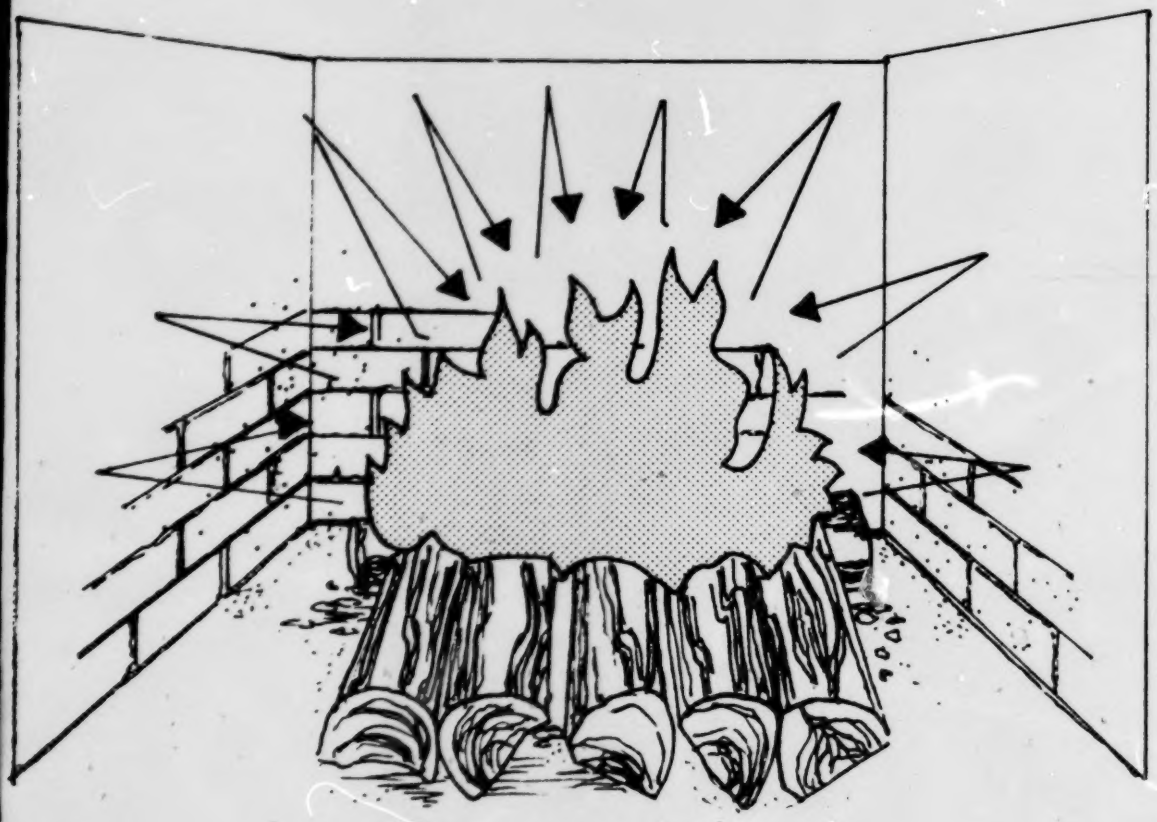


FIRST-FLOOR FIREPLACE WITH ASH PIT IN BASEMENT



RAISED HEARTH FOR ON-GRADE CONSTUCTION

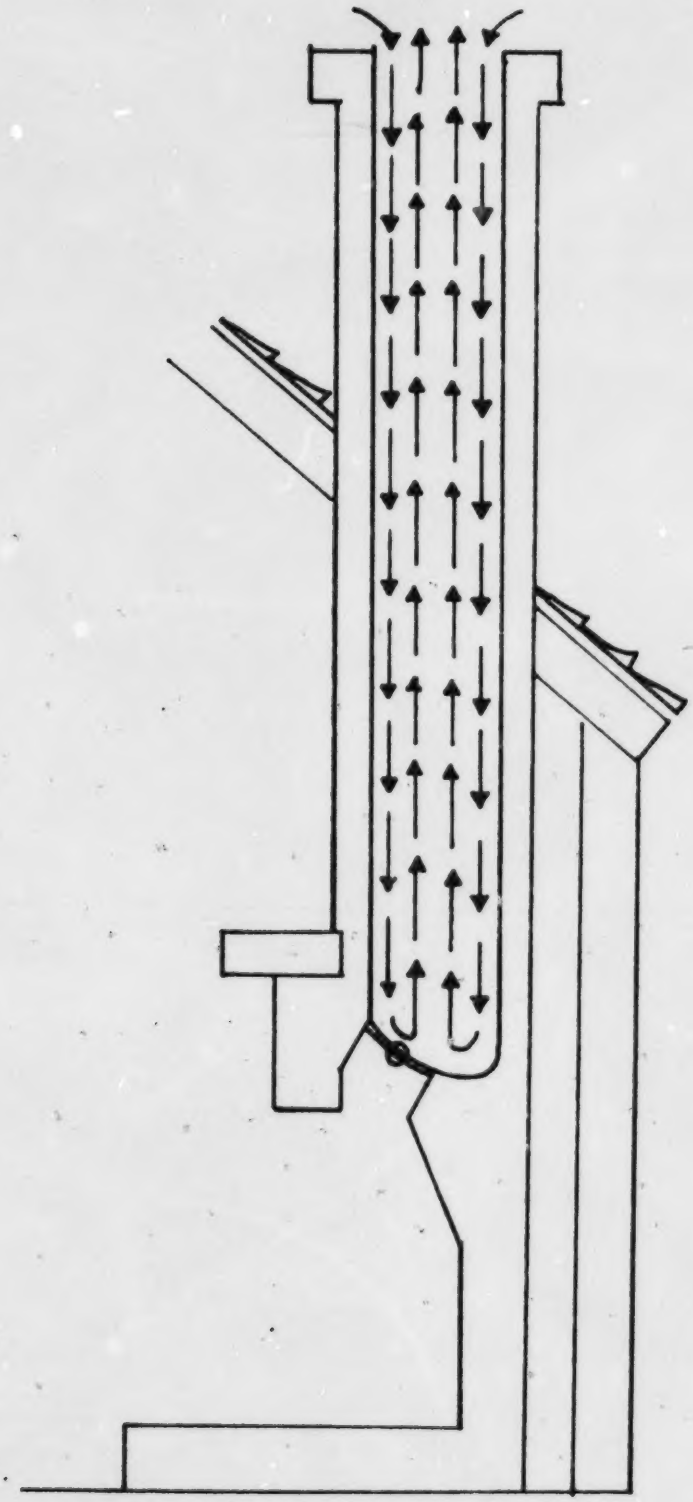
HEAT RERADIATION FOR EFFICIENCY



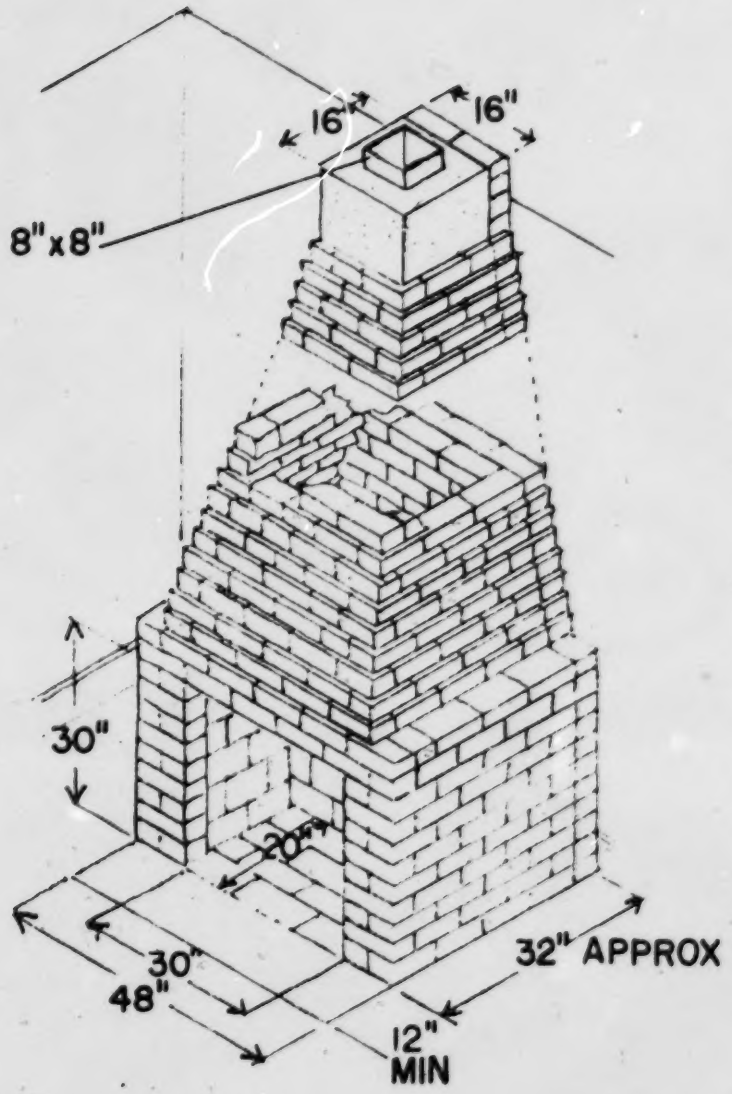
CHIMNEY AIR MOVEMENT
A

CHIMNEY AIR MOVEMENT

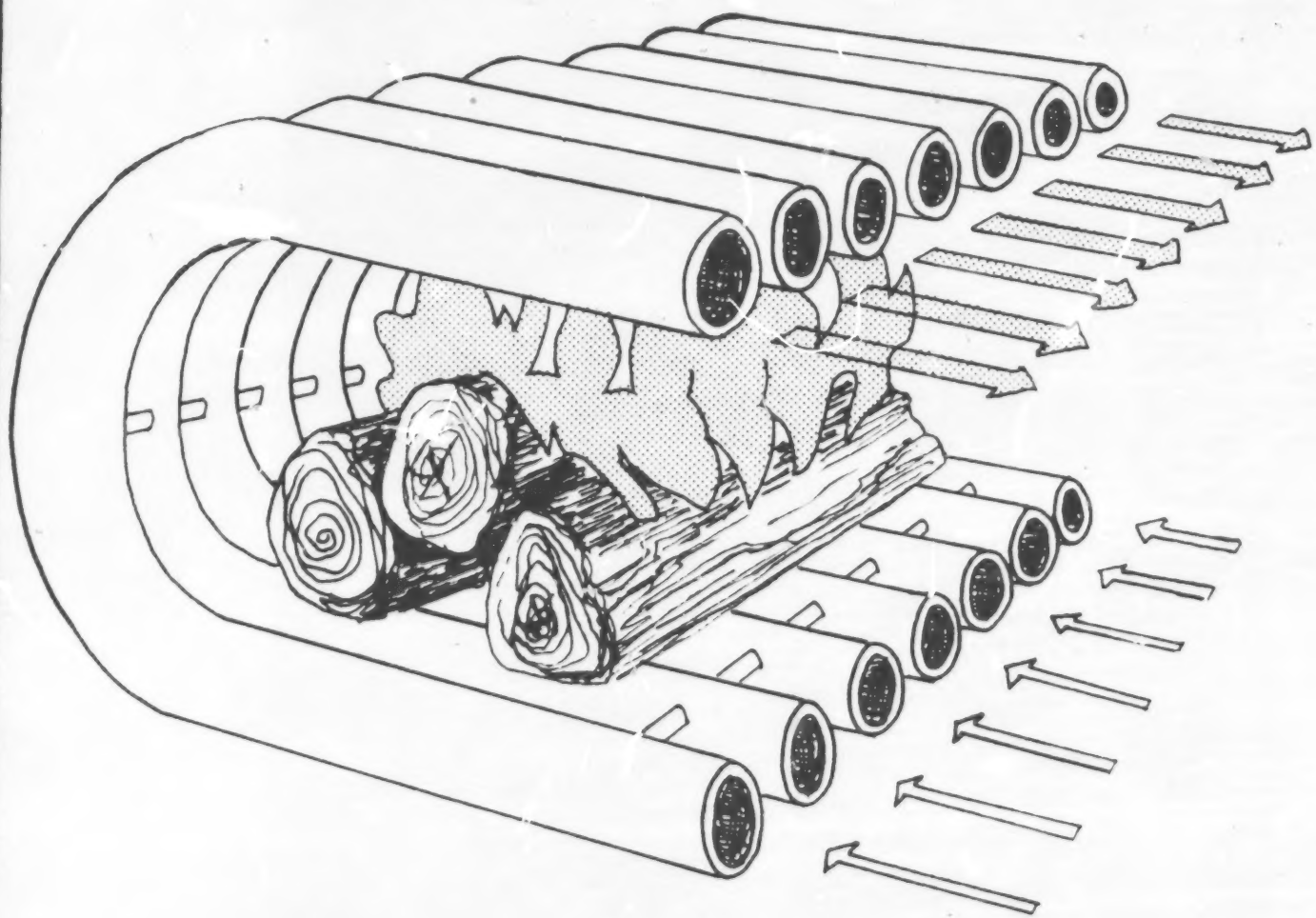
B



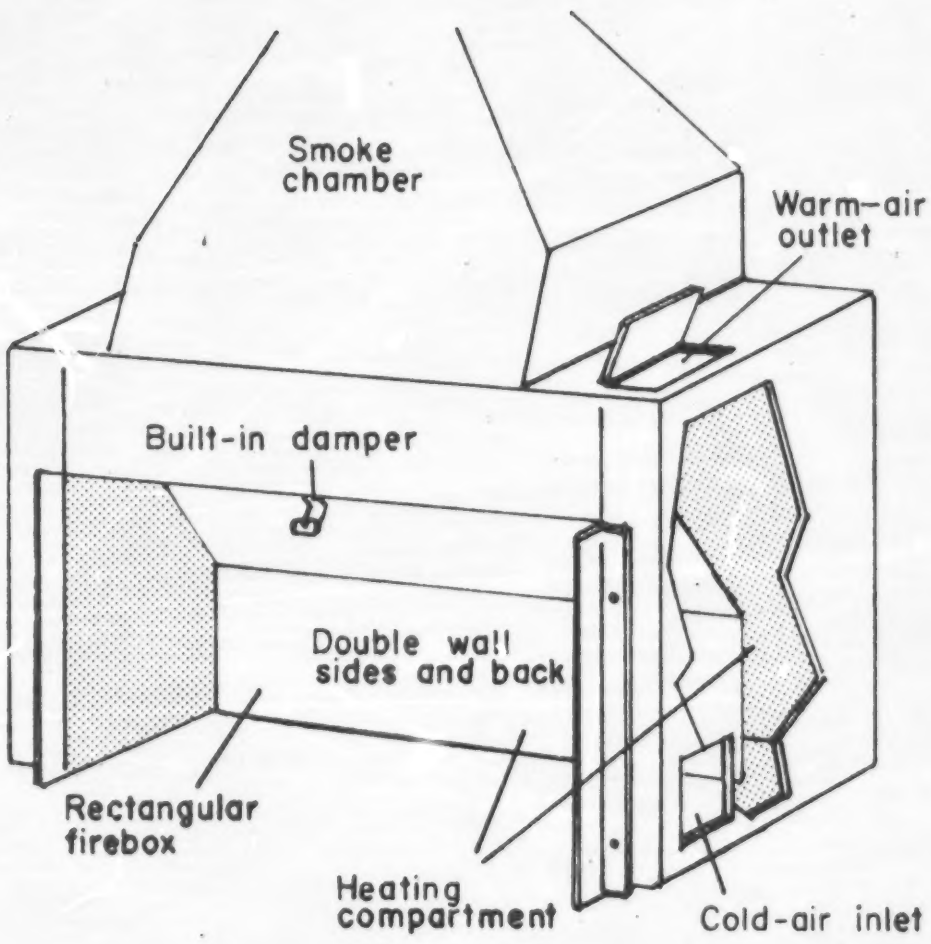
FIREPLACE DIMENSIONS



TUBE TYPE HEAT RECOVERY SAVER



METAL AND FREESTANDING FIREPLACES
A

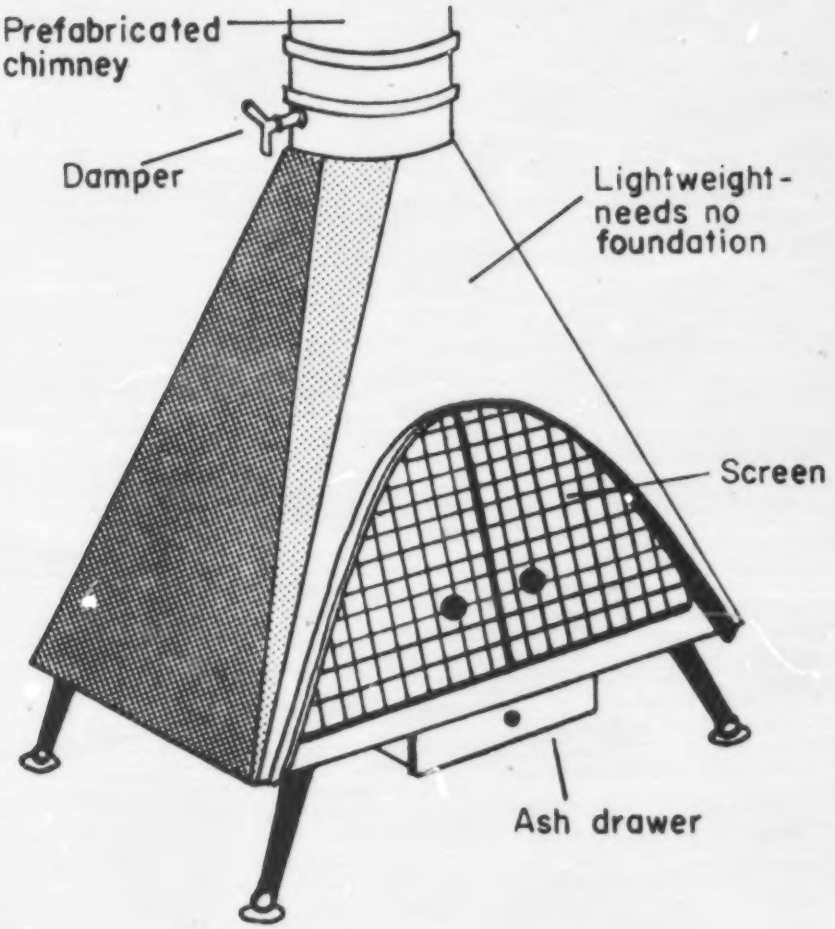


BUILT-IN FIREPLACE CIRCULATOR

24

TM X

METAL AND FREESTANDING FIREPLACES
B



CAN BE INSTALLED ALMOST ANYWHERE IN HOUSE

FIREPLACES AND FIREPLACE FUELS

ASSIGNMENT SHEET #1

Conceptions and Beliefs Concerning Fireplaces and Fuels

Below are a group of commonly held beliefs about fireplaces. React to each of them based upon what you have learned from information in this unit.

1. The fireplace is a cheap, efficient source of heat for the home.

2. Freestanding metal fireplaces are just as good as a built-in masonry one.

3. Only certain kinds of wood are good for burning in the fireplace.

FIREPLACES AND FIREPLACE FUELS

ASSIGNMENT SHEET #2

Fireplace Consumer Evaluation Sheet

Contact a local builder of housing units and obtain the following information concerning fireplaces being constructed.

1. What is the best type of fireplace to construct?

2. What materials are used in construction?

3. What heat loss factors are included in construction?

4. Where is the best location for a fireplace in a home?

5. How much will a fireplace contribute to space heating needs of the structure?

6. What is the average cost of constructing a fireplace in a new home?

8. How efficient is a fireplace?

9. Can any factors be included to increase efficiency?

10. What guarantees does the contractor or builder make to the purchaser concerning fireplaces?

11. Who actually does the construction of the unit itself?

12. Would he recommend putting a fireplace in a new home? Why or why not?

Conclusion:

Did the information given you coincide with what you have learned in this unit? Explain.

How willing and cooperative was he to discuss the subject with you?

Did you learn any additional information that would be valuable to this unit? What?

Given consideration of all the factors as you now know them, would you construct a new home and incorporate a fireplace into its design? Explain your reasoning.

FIREPLACES AND FIREPLACE FUELS

TEST

I. Indicate the correct response by circling "T" for true and "F" for false.

T F 1. The chemical process known as combustion is known as fire.

T F 2. Nitrogen is necessary for combustion to occur.

T F 3. All three elements of the "fire triangle" must be available in sufficient amount for combustion to take place.

T F 4. Point at which combustion occurs will vary with type of fuel used.

T F 5. Concentration of temperature is necessary for combustion of dense materials.

T F 6. Kindling is the small bits of wood and twigs that are used to start fires.

T F 7. When the temperatures of solid fuels are raised sufficiently, the solid matter is transformed into gaseous matter.

T F 8. To continue a burning process, high temperature must be maintained.

T F 9. An excess of air flowing into a fireplace can lower its efficiency.

T F 10. Firebricks provide the most efficient masonry framework for fireplaces.

T F 11. If a fireplace is surrounded with masonry on three sides it will be less effective than if there is masonry only on one side.

T F 12. Most dry woods vary in the degree of heating power they contain.

T F 13. The greatest heat value is to be found in those woods that have been kiln-dried.

T F 14. Green wood contains about 50% moisture.

T F 15. Wood is usually purchased by weight.

T F 16. A "face-cord" differs from a regular "cord" of wood in the length of the pieces of wood.

T F 17. The consumer is likely to get more for his money if he purchases a cord of large logs than he will if the cord is composed of small logs.

T F 18. The amount of water contained in firewood has little effect upon its burning power.

T F 19. Heating value of "green" wood is about half that of kiln-dried woods.

T F 20. Generally speaking, it is a good idea to store wood for approximately six months before using.

T F 21. The hygroscopic nature of wood has little effect upon its ability to absorb water.

T F 22. Storing firewood next to a house endangers the structure to possible termite contamination.

T F 23. Aesthetic qualities of fires can be varied by combining different types of woods.

T F 24. Wood contains up to 40 percent of its weight in oxygen.

T F 25. The damper located in the chimney functions to control flow of air into the fireplace.

T F 26. Most efficient means of control of airflow is by installing glass fireplace enclosures.

T F 27. Fireplaces today do not serve as a major contributor to space heating needs of a structure.

T F 28. Greatest efficiency in fireplaces occurs when fires are built on grate systems.

T F 29. Design of the fireplace has little effect upon the warmth that is projected into a room.

T F 30. The ideal location for a fireplace is on the end of the structure or the exterior wall.

T F 31. Most commercial devices for heat recovery are not efficient.

T F 32. Prefabricated and freestanding metal fireplaces are just as energy efficient as masonry fireplaces.

T F 33. One advantage of metal fireplaces is that it will re-radiate heat back into fire.

T F 34. Fire produced from metal fireplaces is basically a "colder" fire.

T F 35. Metal fireplaces absorb heat quickly.

II. 36. What are the three factors that make up the "fire triangle"?

A.

B.

C.

37. There is a distinct relationship between fuel and temperature that explains why it is nearly impossible for a match to ignite a thick log. Please discuss the concept.

38. What points were discussed in this unit concerning masonry fireplaces?
A.

B.

C.

39. What points should the purchaser keep in mind when selecting firewood? Give four that were discussed in this unit.

A.

B.

C.

D.

40. Firewoods are available from sources other than outright purchase from a dealer. List four that were discussed in the unit.

A.

B.

C.

D.

41. How do glass fireplace enclosures improve efficiency of fireplaces? Include at least three points considered in this unit.

A.

B.

C.

FIREPLACES AND FIREPLACE FUELS

ANSWER SHEET

I. True-false

1. T
2. F
3. T
4. T
5. T
6. T
7. T
8. T
9. T
10. T
11. F
12. F
13. T
14. F
15. F
16. T
17. F
18. F
19. T
20. T
21. F
22. T
23. T
24. T
25. T
26. T
27. T
28. F
29. F
30. F
31. T
32. F
33. F
34. T
35. T

II. 36. Elements of the "fire triangle" include:

A. Temperature

B. Oxygen

C. Fuel

37. Matches will not ignite thick logs because:

A. Wood absorbs heat from the match.

B. Thickness and density of wood need higher temperature and more concentration of heat to absorb enough to bring up log temperature to which it will be ignited.

38. A. Masonry re-radiates heat back into the fire.

B. The fire then burns hotter.

C. Makes use of fuel more completely.

39. Points to keep in mind when planning to buy firewood include:

A. How the wood is cut.

B. How the wood is shaped.

C. How the wood is stacked.

D. Presence of bumpy or crooked logs that can create large air space.

E. Logs piled directly on top of one another instead of in open spaces created by those around them.

F. Size - large logs create big air space - may be actually getting less for money.

40. Firewoods available from non-traditional sources include:

A. Cutting down dead trees (own, neighbors, etc.).

B. Land fills and dumps.

C. Storm damaged trees and limbs.

D. Scrapwood from lumber companies.

E. Trees available from power companies when trees cut down for make-way for power lines.

F. Free firewood available in some national forests with permit.

II. 41. Glass fireplace enclosure features that relate to energy consciousness include these factors:

A. Keeps virtually airtight.

B. Special damper at bottom of enclosure allows precise regulation of airflow.

C. Keeps warm air in room from escaping up through fireplace.

D. Allows fire to be left unattended.

E. Fire is safely contained allowing smoke to escape up the chimney.